



MTR2000™
Base Station, Repeater
and Receiver
For Analog Conventional,
and Trunking Systems
403 - 470 MHz

Instruction / Field Service Manual

68P81096E25-G

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NOTE: The equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial or residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with its instruction manual, may cause harmful interference to radio communication.

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This product conforms with the protection requirements of Council Directive 89/336/EEC of 3rd May 1989 (EMC) on the approximation of the laws of the Member States relating to electromagnetic compatibility.

ENVIRONMENTAL INFORMATION

Material Content

The material content of the MTR2000 is 16% of the product it replaces.

The following table provides a rough estimate of the material content of the station. The actual percentages vary in relation to the station configuration. The power supply is not included in the percentage of weights since the end-of-life value is dependent on the model of supply used in the station.

Most of the Material categories are self explanatory. Copper bearing materials:

- include any material that contains copper.
- primarily consist of circuit boards.
- exclude cables (separate Material category).

| Material | % by weight |
|----------------|-------------|
| Aluminum | 92% |
| Steel | 2% |
| Copper Bearing | 4% |
| Cable | 1% |
| Polycarbonate | 1% |

Beryllium Oxide has been used in the power amplifier. Beryllium Oxide should not be subjected to any process which will generate dust.

Features

Over 92% of the station is made of aluminum, one of the most recycled materials commonly available today. In addition, the aluminum used in the station consists of 90-95% recycled content.

Plastic use has been minimized since the market for recycled engineering plastics is limited. The plastic which has been used for the front panel is a relatively clean and pure resin.

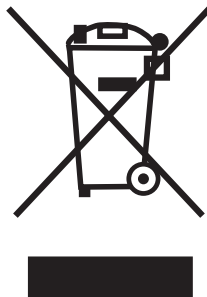
Disposal of your Electronic and Electric Equipment

Please do not dispose of Electronic and Electric Equipment or Electronic and Electric Accessories with your household waste. In some countries or regions, collection systems have been set up to handle waste of electrical and electronic equipment.

In European Union countries, please contact your local equipment supplier representative or service center for information about the waste collection system in your country.

Disposal Guideline

The following symbol on a Motorola product indicates that the product should not be disposed of with household waste.






MTR2000™
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403 - 470 MHz

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Description 1

Input and Output Connections 2

Functional Theory of Operation. 3

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Models CLN1231 and CLN1230 **68P81096E27**

Description 1

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Description 1

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Models CLN1220 and DLN6458

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Model CLN1221

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|----------|--|---|

250 W POWER SUPPLY, AC with DC Backup Connector

Model DLN6624

68P81011Y29

| | | |
|----------|--|---|
| Table 1. | DLN6624 Power Supply Module Performance Specifications | 2 |
|----------|--|---|

500 W POWER SUPPLY, DC-Only

Model CLN1222

68P81096E51

| | | |
|----------|--|---|
| Table 1. | CLN1222 DC-Only Power Supply Module Performance Specifications | 2 |
|----------|--|---|

250 W POWER SUPPLY, DC-Only

Model CLN1223

68P81096E52

| | | |
|----------|--|---|
| Table 1. | CLN1223 DC-Only Power Supply Module Performance Specifications | 2 |
|----------|--|---|

ANCILLARY EQUIPMENT

ANTENNA RELAY MODULE

Model CLN6680 **68P81096E41**

Table 1. Antenna Relay Option X371 AG Complement 7

Table 2. Performance Specifications for Antenna Relay..... 7

UHF EXTERNAL PRESELECTOR MODULE

Models CLN1218 and CLN1219 **68P81096E42**

Table 1. UHF External Preselector Option Complement 4

UHF EXTERNAL DOUBLE CIRCULATOR MODULE

Model CLN1210 **68P81096E48**

Table 1. UHF External Double Circulator Option X676AW Complement 6

Table 2. Performance Specifications for CLN1210 External Double Circulator 7

UHF DUPLEXER MODULE

Models TLE9021 and TLE9022 **68P81085E17**

Table 1. Performance Specifications for UHF Duplexer Module 7

MODEL AND OPTION SELECTION PROCEDURE (INCLUDES MODEL/OPTION COMPLEMENTS)

The following equipment ordering process is used by the sales representative to equip a UHF station with the proper hardware and firmware for specific system types and customer-defined options and features. This process is described here, showing the structure and contents of the various models and options.

1

The Factory ID Model numbers are:

| MTR2000... | Factory ID Model No. | Station Description |
|----------------------------|----------------------|---------------------|
| Base Stations or Repeaters | T5544, T5766 | MTR2000 Station |
| Receivers | T5731, T5769 | MTR2000 Receiver |



Option numbers are used to determine the configuration of an MTR2000 station. The suffixes of these option numbers (i.e., the last 2 characters) may change.

The sales model includes the following items which are **common to all stations**:

- Station Control Module.
- Backplane Interconnect Board.
- Backplane hardware.
- Station chassis hardware.
- Front panel.
- Cables.

For Receivers, the sales model determines that the:

- 250W Power Supply module is included in the station, Option X30AM.

2

If the station is a **Base Station** or a **Repeater**, the power/frequency option is now selected. The power/frequency option is determined based on the power specified by the customer. The following table shows the available power/frequency options:

| Frequency Range – UHF | Output Power | | |
|-----------------------|---------------|---------------|---------------|
| | 30 W | 40 W | 100 W |
| 403 to 435 MHz | – | – | Option X540AG |
| 403 to 470 MHz | Option X341AA | Option X340AE | – |
| 435 to 470 MHz | – | – | Option X540AH |

For Base Stations and Repeaters, the power/frequency option determines which:

- Power Supply module (based on power level) is included in the station; either Option X30AM for the 250 W power supply, or X30AL for the 500 W power supply.
- Power Amplifier module (based on frequency band and power level) is included in the station.
- Exciter module (based on frequency band) is included in the station.
- Receiver module (based on frequency band) is included in the station; Option X334AN.

OR

If the station is a **Receiver**, the frequency option is now selected. The frequency option is determined based on the frequency specified by the customer. The available frequency options are:

| Frequency Range – UHF | Receiver Option |
|-----------------------|-----------------|
| 403 to 470 MHz | Option X320AE |

The frequency option determines which:

- Receiver module (based on frequency band) is included in the station; Option X334AN.

3

A System Software Option must be selected **for Base Stations, Repeaters and Receivers** as follows:

| System Type | Software Option |
|--------------------------------|-----------------|
| Conventional Analog Operation | X597AF |
| Conventional Analog Receiver | X597AG |
| 6809 Trunking Analog Operation | X997AE |
| 6809 Trunking Analog Receiver | X997AF |

If the station is a Receiver, go to step 5.

For Trunking Analog Operation the software option determines that the Auxiliary I.O Board is included in the station; Option X151AH.

4

A Station Operation Option must be selected as follows:

| Operation Type | Operation Option |
|------------------------|------------------|
| Repeater Operation | X580AC |
| Base Station Operation | X622AC |

5

The following lists available options that may be selected in addition to the standard model and options (described in steps 1 through 4).

AVAILABLE OPTIONS FOR UHF STATIONS

| Option Category | Option and Complement | |
|--------------------------------|-----------------------|--|
| DC-Only Power Supplies | X121AC | 500W DC-Only power supply. When this option is ordered, it automatically replaces Option X30AL. |
| | CPN6059A CPN6060A | 500W DC Power Supply DC Power Input Cable |
| | X121AB | 250W DC-Only power supply. When this option is ordered, it automatically replaces Option X30AM. |
| | CPN6058A CPN6060A | 250W DC Power Supply DC Power Input Cable |
| External Preselector | X265AC | External Preselector Module (403 to 433 MHz) |
| | TRN7799 | VHF/UHF Tuning Kit |
| | X265AD | External Preselector Module (433 to 470 MHz) |
| | TRN7799 | VHF/UHF Tuning Kit |
| Wireline Interface Board (WIB) | | When either of the above options is ordered, Receiver Option X334AN is automatically replaced by Option X334AL |
| | X216AC | Add 4-Wire Euro Wireline Interface Board (WIB) |
| | TTN5066A | 4-Wire Euro Wireline Interface Board |
| | X264AA | Add 4-Wire Wireline Interface Board (WIB) |
| | | This WIB is the factory default, unless X216AC is ordered. |
| | TTN5067A | 4-Wire Wireline Interface Board |
| External Double Circulator | X676AW | External Double Circulator Module (403 to 475 MHz) |
| | TLE9120A | Double Circulator (403 to 475 MHz) |
| | TLE9140A | Low Pass Filter |
| | TRN7751A | Peripheral Tray |
| | TKN9133A | Cables, Peripheral Tray |
| | TLN3391A | Circulator Load (heat sink) |
| | | |
| Antenna Relay | X371AG | Antenna Relay |
| | CLN6680A | Antenna Relay |
| External Reference | X747AB | Add External Reference |
| | CKN6682A | External Reference Cable |

AVAILABLE OPTIONS FOR UHF STATIONS

| Option Category | Option and Complement | |
|--------------------------------------|-----------------------|--|
| Duplexer Module | TLE9021A | RF Duplexer (403 to 435MHz) |
| | TLE9022A | RF Duplexer (435 to 470MHz) |
| Mounting Racks | X741AF | 76.2 cm (30 in) Modular Rack |
| | THN6752A | Modular Rack, 16-Rack Unit |
| | CLN6679A | Rack Mounting Hardware |
| | X742AF | 1.143m (45 in) Modular Rack |
| | THN6753A | Modular Rack, 24-Rack Unit |
| | CLN6679A | Rack Mounting Hardware |
| | X743AF | 1.32m (52 in) Modular Rack |
| | THN6754A | Modular Rack, 27-Rack Unit |
| | CLN6679A | Rack Mounting Hardware |
| Slide Rail (for rackmounted station) | X968AA | Slides, Motorola Cabinet |
| | THN6788A | Slide rails for mounting station |
| | X346AB | Slides, Non-Motorola Cabinet |
| | CLN6833A | Universal slide rails for mounting station |
| Indoor Cabinets | X52AF | 76.2 cm (30 in) Indoor Cabinet |
| | THN6701A | 30" Indoor Cabinet, 2 Rails |
| | TTN5040A | Grommet Channel Kit |
| | X308AD | 1.168m (46 in) Indoor Cabinet |
| | THN6702A | 46" Indoor Cabinet, 2 Rails |
| | TTN5040A | Grommet Channel Kit |
| | X180AC | 1.524m (60 in) Indoor Cabinet |
| | THN6703A | 60" Indoor Cabinet, 2 Rails |
| | TTN5040A | Grommet Channel Kit |
| Trunking Cables | 3083765X04 | 7.62m (25 ft) Trunk Cable |
| | 3083765X05 | 15.24m (50 ft) Trunk Cable |
| | 3083765X06 | 22.86m (75 ft) Trunk Cable |
| | 3083765X07 | 30.48m (100 ft) Trunk Cable |
| Miscellaneous | HSN1000 | External Speaker |
| | 0185180U01 | External Speaker Cable |
| | GMN6147 | Service Microphone |

FOREWORD

Product Maintenance Philosophy

Due to the high percentage of surface-mount components and multi-layer circuit boards, the maintenance philosophy for this product is one of Field Replaceable Unit (FRU) substitution. The station is comprised of self-contained modules (FRUs) which, when determined to be faulty, may be quickly and easily replaced with a known good module to bring the equipment back to normal operation. The faulty module must then be shipped to the Motorola System Support Center for further troubleshooting and repair to the component level.

The System Support Center can be contacted at:

| Address | Phone No. | FAX No. |
|--|----------------|----------------|
| Motorola Systems Support Center 1311 East Algonquin Rd. Schaumburg IL, 60196, USA | (800) 925-0911 | (847) 576-2172 |

For other issues call:

(800) 448-3245

or

(847) 576-7300

Scope of Manual

This manual is intended for use by experienced technicians familiar with similar types of equipment. In keeping with the maintenance philosophy of Field Replaceable Units (FRU), this manual contains functional information sufficient to give service personnel an operational understanding of all FRU modules, allowing faulty FRU modules to be identified and replaced with known good FRU replacements.

The information in this manual is current as of the printing date. Changes which occur after the printing date are incorporated by Instruction Manual Revisions (SMR). These SMRs are added to the manuals as the engineering changes are incorporated into the equipment.

Documentation Conventions

Documentation conventions are used in this manual to highlight certain information.

The area to the left of the text column contains key words and graphic symbols which allow the reader to quickly identify desired information.

The following text highlight symbols are used:



A note symbol indicates important information that helps improve the described function.



CAUTION

A caution symbol indicates a potential problem, unless the proper actions are taken. A caution also explains how to avoid the problem.



WARNING

A WARNING symbol indicates the potential for personal injury or serious system degradation unless the proper actions are taken. A WARNING also explains how to avoid the problem.



IMPORTANT

An IMPORTANT symbol indicates the potential for damaging the station unless the proper actions are taken. An IMPORTANT note also explains how to avoid the problem.



This graphic symbol appears in this manual and on the station front panel (and other station surfaces) as a reminder that the station can become extremely hot during normal station operation. Turn off all power to the station, and wait until sufficiently cool before touching the station.

Service and Replacement Modules

For complete information on ordering FRU replacement modules, or instructions on how to return faulty modules for repair, contact the appropriate facility:

| | Address | Phone No. | FAX No. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|------------------|------------------|----------|-------------|--------|--------------|----------|--------------|------------|-------------|----------|-------------|--------------|-------------|-----------|----------------|---------|-------------|---------|----------------|-----------|----------------|----------|----------------|--------|--------------|---------|--------------------|---------|--------------|-----|----------------|--------------|----------------|----------|----------------|----------|-----------|
| United States | Motorola Inc. Radio Products Services Division 2200 Galvin Dr. Elgin, IL, 60123, USA | (800) 422-4210 | (800) 622-6210 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Canada | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| International | | (847) 538-8023 | (847) 576-3023 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mexico | Motorola de Mexico Huatabampo No. 50 APDO Postal 71064 Mexico DF 06700 | (525) 584-4560 | (525) 584-6843 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Asia | Motorola Singapore Parts Centre 1302 Lor 1 Toa Payoh Siong Hoe Ind Bldg. #01-03/04 Singapore 1231 | (65) 353-0311 | (65) 353-9152 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Australia & New Zealand | Motorola Australia Ltd. 666 Wellington Rd. Victoria 3170 Melbourne Australia | (61) 3 566-7766 | (61) 3 566-7910 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Japan | Nippon Motorola Ltd. 3-20-1 Ninomi Azabu Minato-Ku Tokyo 106 Japan | (81) 3 3440 3311 | (81) 3 3440 3505 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Europe, Mideast & Africa | Motorola GmbH Heinrich - Hertz Strasse 1 D-65232 Taunusstein 4 Germany | 0049-6128-702164 | 0049-6128-704903 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OR Local phone numbers are available for the following European countries: <table> <tr> <td>Austria:</td><td>06 60 75 41</td><td>Italy:</td><td>16 78 77 387</td></tr> <tr> <td>Belgium:</td><td>08 00 72 471</td><td>Luxemburg:</td><td>08 00 23 27</td></tr> <tr> <td>Denmark:</td><td>80 01 55 72</td><td>Netherlands:</td><td>60 22 45 13</td></tr> <tr> <td>Finnland:</td><td>08 00 11 49 10</td><td>Norway:</td><td>80 01 11 15</td></tr> <tr> <td>France:</td><td>08 00 90 30 90</td><td>Portugal:</td><td>05 05 49 35 70</td></tr> <tr> <td>Germany:</td><td>01 30 18 75 24</td><td>Spain:</td><td>90 09 84 902</td></tr> <tr> <td>Greece:</td><td>00 80 04 91 29 020</td><td>Sweden:</td><td>02 07 94 307</td></tr> <tr> <td>UK:</td><td>08 00 96 90 95</td><td>Switzerland:</td><td>08 00 55 30 82</td></tr> <tr> <td>Ireland:</td><td>18 00 55 50 21</td><td>Iceland:</td><td>80 08 147</td></tr> </table> | | | | Austria: | 06 60 75 41 | Italy: | 16 78 77 387 | Belgium: | 08 00 72 471 | Luxemburg: | 08 00 23 27 | Denmark: | 80 01 55 72 | Netherlands: | 60 22 45 13 | Finnland: | 08 00 11 49 10 | Norway: | 80 01 11 15 | France: | 08 00 90 30 90 | Portugal: | 05 05 49 35 70 | Germany: | 01 30 18 75 24 | Spain: | 90 09 84 902 | Greece: | 00 80 04 91 29 020 | Sweden: | 02 07 94 307 | UK: | 08 00 96 90 95 | Switzerland: | 08 00 55 30 82 | Ireland: | 18 00 55 50 21 | Iceland: | 80 08 147 |
| Austria: | 06 60 75 41 | Italy: | 16 78 77 387 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Belgium: | 08 00 72 471 | Luxemburg: | 08 00 23 27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Denmark: | 80 01 55 72 | Netherlands: | 60 22 45 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Finnland: | 08 00 11 49 10 | Norway: | 80 01 11 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| France: | 08 00 90 30 90 | Portugal: | 05 05 49 35 70 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Germany: | 01 30 18 75 24 | Spain: | 90 09 84 902 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Greece: | 00 80 04 91 29 020 | Sweden: | 02 07 94 307 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UK: | 08 00 96 90 95 | Switzerland: | 08 00 55 30 82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ireland: | 18 00 55 50 21 | Iceland: | 80 08 147 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Station FRU Components

The following Field Replacement Units (FRUs) can be ordered for an MTR2000 UHF station:

| Module Description | FRU Kit # |
|---|-----------|
| Receiver Module (403 to 470 MHz) - with varactor preselector | CLN1213 |
| Receiver Module (403 to 470 MHz) - without varactor preselector | CLN1214 |
| Exciter Module (403 to 470 MHz) | CLN1234 |
| Station Control Module | CLN1465 |
| Power Amplifier (30 W, 403 to 470 MHz) | CLN1231 |
| Power Amplifier (40 W, 403 to 470 MHz) | CLN1230 |
| Power Amplifier (100 W, 403 to 435 MHz) | CLN1228 |
| Power Amplifier (100 W, 435 to 470 MHz) | CLN1229 |
| Station Backplane Board | CLN1202 |
| Power Supply (250 W), AC with DC Battery Connect - provided with all low power stations using AC input. | CLN1221 |
| Power Supply (500 W), AC with DC Battery Connect - provided with high power stations installed outside of the European Union (EU) countries and installed in EU countries prior to January 1, 2001. | CLN1220 |
| Power Supply (500 W), AC with DC Battery Connect - provided with high power stations installed in EU countries after January 1, 2001. - operates in conjunction with a Power Factor Correction choke. | DLN6458 |
| Power Supply (250 W), DC-Only | CLN1223 |
| Power Supply (500 W), DC-Only | CLN1222 |
| Power Supply (250 W), AC/DC | DLN6624 |
| Power Supply (500 W), AC/DC | DLN6622 |
| 4-Wire Wireline Interface Board | CLN1203 |
| 4-Wire Euro Wireline Interface Board | CLN1204 |
| 8-Wire Wireline Interface Board | CLN1205 |
| Auxiliary I/O Board | CLN1206 |
| Antenna Relay | CLN6680 |
| External Double Circulator (403 to 470 MHz) | CLN1210 |
| External (metal) Preselector (403 to 433 MHz) | CLN1218 |
| External (metal) Preselector (433 to 470 MHz) | CLN1219 |
| Duplexer Module (403 to 435 MHz) | TLE9021 |
| Duplexer Module (435 to 470 MHz) | TLE9022 |
| Zetron Repeater Panel | TDN9946 |

Need help to identify a part number?

If help is required to identify a part number, call:

(847) 538-0021

GENERAL SAFETY INFORMATION

The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic energy safety standard which applies to the use of this equipment. Proper use of this radio will result in exposure below the OSHA limit. The following precautions are recommended:

- DO NOT operate the transmitter of a mobile radio when someone outside the vehicle is within two feet (0.6 meter) of the antenna.
- DO NOT operate the transmitter of a fixed radio (base station, microwave and rural telephone RF equipment) or marine radio when someone is within two feet (0.6 meter) of the antenna.
- DO NOT operate the transmitter of any radio unless all RF connectors are secure and any open connectors are properly terminated.

In addition:

- DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- All equipment must be properly grounded according to Motorola installation instructions for safe operation.
- All equipment should be serviced only by a qualified technician.
- An operating license may be required to operate this station.

Refer to the appropriate section of the product service manual for additional pertinent safety information.



Some station components can become extremely hot during station operation. Turn off all power to the station, and wait until sufficiently cool before touching the station.

PERFORMANCE SPECIFICATIONS

General

| | | | | |
|--------------------------------|---|----------------|----------------|-------|
| Frequency Range: | 403 to 470 MHz | | | |
| Number of Channels: | 32 | | | |
| Frequency Generation: | Synthesized | | | |
| Power Supply Type: | Switching | | | |
| Power Supply Input Voltage: | 85 to 264 Vac (for Models CLN1220 and CLN1221) 180 to 264 Vac (for Model DLN6458; used in conjunction with a PFC choke) | | | |
| Power Supply Input Frequency: | 47 to 63 Hz | | | |
| Current Consumption (typical): | <u>DC</u> | <u>120 Vac</u> | <u>240 Vac</u> | |
| Low Power station | Standby | 1.5 A | 0.5 A | 0.3 A |
| | Transmit | 9.0 A | 2.4 A | 1.3 A |
| High Power station | Standby | 0.9 A | 0.6 A | 0.4 A |
| | Transmit | 12.0 A | 5.4 A | 2.9 A |
| | Note: DC voltage is 14Vdc for low power stations and 28Vdc for high power stations. Current consumption values during transmit are at full rated output. | | | |
| Temperature Range (ambient): | –30°C (–22°F) to +60°C (+140°F), measured at station | | | |
| Dimensions: | 48.3 cm (19") x 41.3 cm (16.5") x 13.4 cm (5.25") | | | |
| Approximate Weight: | 19 kg. (40 lbs.) | | | |
| Environmental Spec. | I.P. 20 | | | |

Transmitter

| | |
|----------------------------------|--|
| Power Output: | 2 to 30 W 2 to 40 W 25 to 100 W |
| Electronic Bandwidth ≤ 40 W: | 403 to 470 MHz |
| Electronic Bandwidth > 40 W: | 403 to 435 MHz, 435 to 470 MHz |
| Intermodulation: | 40 dB (40 W and 100 W) 70 dB (30 W) |
| Spurious and Harmonic Emissions: | –85 dBc |
| Deviation: | ±5 kHz (30 kHz) ±5 kHz (25 kHz) ±4 kHz (20 kHz) ±2.5 kHz (12.5 kHz) |
| Audio Sensitivity: | –20 dBm to 0 dBm (variable) |

PERFORMANCE SPECIFICATIONS (Cont'd)

Transmitter (continued)

| | |
|----------------------|---|
| Audio Response: | +1, –3 dB from 6 dB per octave pre-emphasis; 300 to 3000 Hz referenced to 1000 Hz at line input |
| Audio Distortion: | <3% @ 1000 Hz; 60 % RSD |
| FM Hum and Noise: | 50 dB nominal (30 kHz) 50 dB nominal (25 kHz) 45 dB nominal (12.5 kHz) |
| Frequency Stability: | 1.5 ppm |

Receiver

| | |
|--|---|
| Electronic Bandwidth w/o Narrow Preselector: | 403 to 470 MHz |
| Narrow Preselector Bandwidth: | 4 MHz |
| Channel Spacing: | 12.5 kHz, 20 kHz, 25 kHz, 30 kHz |
| Sensitivity (12 dB SINAD) | 0.35 μ V |
| Selectivity: | 80 dB (25 kHz) 75 dB (12.5 kHz) |
| Intermodulation: | 85 dB (25 kHz) 80 dB (12.5 kHz) |
| Spurious and Image Rejection: | 90 dB with external Preselector, 85 dB nominal with internal Preselector |
| Off Channel Acceptance: | 2 kHz |
| FM Hum and Noise: | 50 dB nominal (25 kHz) 45 dB nominal (12.5 kHz) |
| Wireline Output: | –20 dBm to 7 dBm @100% RSD 1 kHz |
| Audio Response (@ Wireline output): | +1, –3 dB from 6 dB per octave de-emphasis; 300 to 3000 Hz referenced to 1000 Hz output |
| Audio Distortion: | <3 % @ 1000 Hz; 60 % RSD |
| Frequency Stability: | 1.5 ppm |

Due to Motorola's commitment to quality, all specifications subject to change without notice.

GLOSSARY OF TERMS AND ACRONYMS

A

| | |
|------------|---|
| AGC | Automatic Gain Control |
| Alert tone | Audio signal produced by the station, providing feedback to the user. |
| ASIC | Application Specific Integrated Circuit |
| AUX | Auxiliary. |

C

| | |
|--------------|--|
| CCI | Control Channel Indicate |
| CDCSS | Continuous Digital-Controlled Squelch Systems (DPL) |
| CTCSS | Continuous Tone-Controlled Squelch Systems (PL) |
| CIT | Central Interconnect Terminal. Used to provide telephone interconnect capability in a trunked station. |
| CIU | Console Interface Unit. Interface between operator console and station to provide encryption/decryption functions. |
| Clear | Channel modulation type in which voice information is transmitted over the channel using analog modulation. |
| Code detect | Traditional term used to indicate that a 12kbps CVSD signal is being received on the RF channel. |
| Conventional | Term used for standard non-trunked radio system (usually using TRC/DC console). |
| CPI | Console Priority Interface - option allowing console control of a trunked station. |

D

| | |
|-----|--|
| DDM | Dual Device Module |
| DPL | Digital Private Line (See PL) |
| DSP | Digital Signal Processor, microprocessor specifically designed to perform digital signal processing algorithms. |
| DVP | Digital Voice Protection, or Digital Voice Privacy, applies to the Vulcan encryption algorithm and the Motorola product in which it is sold. |

E

| | |
|-----|--|
| EIA | Electronic Industries Association |
| E/M | Telephone circuit signalling lines (Ear/Mouth, Ernie/Mary) |
| EOM | End-Of-Message, 6 kHz signal transmitted at the end of a 12 kbps CVSD signal that is used by the receiving unit for fast muting of the speaker audio for squelch tail elimination. |
| ESD | Electro Static Discharge |
| ETS | European Telecommunications Standards |
| EU | European Union |

F to H

| | |
|----------|---|
| Failsoft | Trunked station mode entered when central controller fails. |
| FFSK | Fast FSK |
| FM | Frequency Modulation |
| FRU | Field Replaceable Unit. |
| FSK | Frequency Shift Keying |
| GPI | General Purpose Input. |
| GPO | General Purpose Output. |
| HLGT | High Level Guard Tone |

I to L

| | |
|------|---|
| IC | Integrated Circuit |
| i-f | intermediate frequency |
| I/O | Input or Output |
| IRB | Inbound Recovery Board used with the Trunking Controller |
| IRQ | Interrupt Request. |
| ISW | Inbound Signalling Word, data packet transmitted on the inbound Trunking control channel by the subscriber unit when requesting channel allocation. |
| LLGT | Low Level Guard Tone |

M to O

| | |
|--------|--|
| MAN_CS | Manual Channel Select. |
| MDC | Motorola Data Communications. 1200 or 4800 baud data signalling scheme. |
| MISO | Master In, Slave Out. |
| MON | Monitor. |
| MOSI | Master Out, Slave In. |
| MRTI | Microprocessor Radio-Telephone Interconnect; a Motorola system that provides a repeater connection to the telephone network (The MRTI allows the radio to access the telephone network when the proper access code is received). |
| MSK | Minimum Shift Keying |
| OSW | Outbound Signalling Word, data packet transmitted on the outbound Trunking control channel by the central controller that contains call assignment information for the subscriber. |

P

| | |
|------|--|
| PA | Power Amplifier that transmits final RF signal to transmit antenna |
| PFC | Power Factor Correction |
| PL | Private-Line tone squelch; a continuous subaudible tone that is transmitted along with the carrier (A radio that has PL on the receive frequency will require both the presence of carrier and the correct PL tone before it will unmute). Also, if there is PL on the transmit frequency, all transmissions by the radio will be modulated with the PL tone. Modulation will be continuous. |
| PLL | Phase locked loop; a circuit in which an oscillator is kept in phase with a reference, usually after passing through a frequency divider. |
| PSTN | Public Switched Telephone Network |
| PTT | Push-to-talk; the switch located on the left side of the radio which, when pressed causes the radio to transmit. |

R

| | |
|----------|---|
| RA/RT | Remote Access/Remote Transmit |
| RAC | Repeater Access Control |
| RdStat | Receiver Data Status |
| Repeater | Remote transmit/receive facility that retransmits received signals in order to improve communications range and coverage. |
| RF | Radio Frequency |
| RSS | Radio Service Software; the software application used to program and service the station. |
| RSSI | Received Signal Strength Indicator; a dc voltage proportional to the received RF signal strength. |

S

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| SCM | Station Control Module; station controller. |
| SINAD | Acronym for the ratio of signal plus noise plus distortion and noise plus distortion. |
| SMR | Schaumburg Manual Revision |
| Smart Repeater | Trunking system in which channel control is distributed among several repeaters. |
| Spectra-TAC | Analog Total Area Coverage voting comparator used to select wide area receivers. |
| SPI | Serial Peripheral Interface (clock and data lines); simple synchronous serial interface for data transfer between processors and peripheral ICs. |
| Squelch | Automatic receiver quieting accomplished by muting audio circuits when received signal levels fall below a pre-determined value. |
| SRAM | Static RAM, memory chip used for scratchpad memory. |

T

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| TCC | Trunking Central Controller; main control unit of the trunked dispatch system; handles ISW and OSW messages to and from radios in the field (See ISW and OSW). |
| TOC | Turn Off Code; alternating binary pattern used by DPL signalling to provide fast muting of the receiving radio. |
| TRC | Tone Remote Control |
| Trunking | Radio control system which permits efficient frequency utilization and enhanced control features. |
| Type II Trunking | Motorola trunking system which provides extended features. |

U, V

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| UHF | Ultra High Frequency |
| VHF | Very High Frequency |
| VCO | Voltage-Controlled Oscillator; an oscillator whereby the frequency of oscillation can be varied by changing a control voltage. |
| VOX | Voice Operated Switch; Used with MRTI. |
| VSWR | Voltage Standing Wave Ratio. |

W to Z

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| WCI | Wildcard Input |
| WCO | Wildcard Output |
| WFI | Word Frame Interrupt; used to synchronize trunking data messages in a Smart Repeater system. |
| Wide Area | Wide area systems allow expanded radio coverage by using multiple receivers and/or transmitters. |
| WL | Wireline |
| WL Rx | Wireline Receive; information from station rf receiver sent to wireline equipment. |
| WL Tx | Wireline Transmit; information from wireline equipment sent to station rf transmitter. |